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American Electroplaters Society

A SOCIETY FOR THE ADVANCEMENT

OF THE

SCIENCE OF ELECTROPLATING

AUGUST, 1929

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INDEX-CONTENTS

	Page
Editorial	3
Reports—Committee's Prize and Resolution	4-5
Report of Secretary-Treasurer	6-7
Determination Boric Acid in Nickel Plating Baths—H. H. Willard and G. W. Ashworth	7-10
Pittsburgh Industries Co-operate with Electro-Chemists	11-40
Secretary's Notice	11
Barrel Burnishing—LeRoy Beaver, Philadelphia Branch	12-23
Chas. H. Proctor, New York Branch—What Have We Learned from Sargent's Solution?	23-31
Philadelphia Branch Report, Research Meeting	31-33
Branch News	31-44
Reports to Convention	44-47
Directory	48

MONTHLY REVIEW

Published by the

American Electroplaters Society

Publication and Editorial Office

3040 Diversey Ave., Chicago

VOL. XVI AUGUST, 1929 No. 8

EDITORIAL

Our Research at the Bureau of Standards must continue if we wish to profit from the funds subscribed during last three years from manufacturers and branch societies and it is hoped that the past subscribers will be augmented by many new ones and the old ones continue to support this program.

Dr. Blum of the Bureau of Standards, whose difficult job it is to oversee the research and at same time do his duty to his governmental position, gives unselfishly many hours of the time he could devote to his family. Can we not give the financial support that this progress in electro-deposition demands, when it is so nominal, comparatively speaking, after measuring results possible to obtain, and our annual meetings attest this?

For employers of Plating Room Executives, and Foremen of Electro-Chemists to send these men after the problems that face us each day in this fast developing field without equipping them with a knowledge of substantial research, such as our fellowship is making at the Bureau of Standards, is a neglect of good business principles that they display in the management of their factories, and reminds one of sending soldiers to war without ammunition. Let us all get behind the Research Fund and go.

Report of Prize Papers Awards Committee

(Presented at Banquet)

The awards for papers are as follows:

1st Prize and Gold Medal—F. C. Mesle, Rochester, N. Y., "SILVER PLATING."

2nd Prize—Class of Newark Branch, Newark, N. J., "EXPERIMENTS ON CHROMIUM PLATING."

3rd Prize—H. K. Work, Pittsburgh, Pa., "ELECTROPLATING ON ALUMINUM."

Honorable Mention—J. Hay, Detroit, Mich., "CHROMIUM PLATING." B. F. Lewis, Detroit, Mich., "CHROMIUM PLATING ON DIE CASTINGS."

Respectfully submitted,

F. J. HANLON
A. K. GRAHAM
G. B. HOGABOOM
W. BLUM
WM. DELAGE
O. J. SIZELOVE, Chairman.

Report of Prize Award Committee on Exhibits of Plated Finishes at Convention of American Electro-Platers Society, Statler Hotel, Detroit, Michigan, July 8-11, 1929

1st Prize—Mr. F. Weber, St. Louis Branch.

2nd Prize—Mr. Geo. Raab, Detroit Branch.

3rd Prize—Mr. J. M. Berenato, Philadelphia Branch.

Honorable Mention—Mr. E. Hartz of Detroit Branch; The Exhibit of the Los Angeles Branch of Chromium Plated Material, and Mr. O. E. Servis, Chicago Branch.

The Committee regrets that many of the exhibits were not eligible for Prize Award because they were not accompanied by Formula and Method of Process.

Respectfully submitted,

FRANK J. MacSTOKER
PHILIP UHL
E. J. MUSICK
F. C. MESLE

The following resolutions were also adopted at the Banquet, Thursday evening:

"WHEREAS, The American Electro-Platers' Society has been holding its Annual Meeting and Convention this year in the city of Detroit, Michigan, and

"WHEREAS, the burden of the work of preparing for this meeting and convention has been borne by the members of the Detroit Branch of the Society through its organized committees, covering the Educational program; the complete hotel arrangements that have been made; the plans for plant visitation; the means of transportation provided for this purpose; the splendid program for the entertainment of the ladies, and for the convention as a whole, therefore be it

"RESOLVED, That the delegates and visitors attending this Convention extend to the members of the Detroit Branch this expression of their appreciation for the work so excellently carried out to make our stay happy, comfortable and memorable."

(Unanimously adopted.)

The following resolution was also submitted by the Resolutions Committee:

"WHEREAS, The American Electro-Platers' Society have been holding their Annual Convention as the guests of the Statler Hotel, Detroit, Michigan, and

"WHEREAS, It is the realization of the delegates and visitors that the Statler Hotel management have done everything in their power to make our stay pleasant and comfortable, therefore be it

"RESOLVED, That this Convention express to the Management our thanks and appreciation of their efforts and their best wishes for a pleasant stay while in their city."

DAN WITTIG
WALTER S. BARROWS
WALTER FRAINE
(Resolutions Committee)

(The Resolution was unanimously adopted.)

AMERICAN ELECTRO-PLATERS SOCIETY

Secretary-Treasurer's Membership and Financial Report, Fiscal Year Ending May 31, 1929

Total Receipts

Per Capita Tax from Branches	$2,684.19	
Supplies to Branches	23.07	
Donations from Toronto Convention Committee	200.00	
Sale of Convention Reports to Branches	113.47	
Sale of Convention Reports to Members	234.68	
Interest on Bank Account	97.89	
Total	$3,353.30	$3.353.30

Total Expenditures

Printing and Mailing "Monthly Review"	$1,735.12	
Printing Supplies for Branches	45.29	
Advertising in Trade Papers	11.00	
Officers' Salaries	250.00	
Officers' Traveling Expenses	356.81	
Convention Expenses (Reporting Letters-Reports)	572.49	
President's Office Expenses	15.63	
Editor's Office Expenses	47.34	
Secretary's Office Expenses	62.91	
Secretary's Bond	2.50	
Gold Medal	25.00	
Prize Award Certificates	9.80	
Total	$3,133.89	$3,133.89
Total Gain for Year		$ 219.41

Recapitulation

Cash on Hand June 1, 1928	$2,422.64
Total Receipts for the Year	3,353.30
Total	$5,775.94
Total Expenses for the Year	$3,133.89
Total Cash on Hand June 1, 1929	$2,642.05

$2,004.11 of the above funds are on deposit in the savings account with the Bankers Trust Co., Philadelphia, Pa.

$ 637.94 of the above funds are on deposit in the check account with the Bankers Trust Co., Philadelphia, Pa.

Respectfully submitted, June 20, 1929.

GEO. GEHLING,
Secretary-Treasurer.

BRANCH	Members June 1, 1928	Elected	Reinstated	Suspended	Resigned	Died	Loss by Transfer	Gain by Transfer	Total Members May 31, 1929	Receipts from Branches P.C.T.	Supplies	Convention Reports	Balance Due from Branches
Chicago	223	16	1	26	2	4	1	..	207	$ 444.66	$ 3.00	$ 3.76	.....
St. Louis	60	5	..	..	2	..	..	..	63	101.32	.....	7.41	$ 34.12
Hartford, C. V.	41	6	..	4	2	1	..	1	41	92.93	.....	3.67	.....
Toronto	64	8	2	4	2	..	1	..	67	137.55	.97	7.40	.....
Boston	11	..	1	..	..	..	1	..	11	22.04	1.50	3.50	.....
Dayton	28	4	..	..	..	..	1	..	31	62.99	.....	3.71	.....
Waterbury	31	2	..	..	..	..	..	..	33	50.40	.....	3.67	17.32
Detroit	75	6	3	12	..	1	..	..	71	109.20	3.00	3.71	35.70
Bridgeport	58	4	..	4	1	1	1	..	55	112.34	1.50	3.64	.....
Cincinnati	38	..	..	..	..	..	..	..	38	39.90	.....	.....	63.56
Cleveland	39	5	..	2	..	..	..	..	42	88.20	.....	25.32	.....
Grand Rapids	27	6	..	..	2	..	..	..	31	58.79	.....	3.71	.....
Indianapolis	24	1	1	3	..	..	..	..	23	48.83	.....	3.71	.....
Milwaukee	53	4	..	..	..	..	..	1	58	114.97	3.00	3.82	.....
Montreal	22	2	..	2	..	1	1	..	20	42.00	.....	10.96	.....
New York	107	13	1	..	..	..	6	..	115	230.46	.....	3.64	.....
Newark	86	16	1	2	1	1	..	5	104	201.60	3.00	3.64	.....
Philadelphia	111	20	1	5	1	2	4	..	120	237.82	.....	3.50	.....
Providence	40	1	..	4	2	1	..	..	34	132.30	.....	3.67	.....
Pittsburgh	34	5	..	..	..	1	2	..	36	76.63	.60	3.69	.....
Rochester	62	13	..	..	1	..	..	..	74	144.37	1.50	3.67	.....
Toledo	26	3	..	2	..	..	1	..	26	55.12	.....	3.67	.....
Balto.-Washington	10	17	..	..	..	..	..	7	34	46.17	3.50	....	.....
Worcester	17	4	..	..	..	..	..	1	22	33.60	1.50	....	.....
Los Angeles	0	23	..	..	..	..	..	..	23	.....	.....	....	.....
TOTALS	1287	184	11	70	16	13	19	15	1379	$2684.19	$23.07	$113.47	$150.70

THE DETERMINATION OF BORIC ACID IN NICKEL PLATING BATHS

By H. H. Willard and G. W. Ashworth

There is no satisfactory and rapid method for determining boric acid in nickel plating baths containing fluoride, ammonium salts and citrate. Baker (U. S. Pat. 1504207, Aug. 12, 1924) and Girl (Can. Pat. 246662, Feb. 10, 1924) describe direct titrations of boric acid in a solution containing mannitol, without removal of nickel, using a mixture of bromcresol purple and bromthymol blue as indicator, but this procedure is not applicable in the presence of the above substances.

The procedure always used for determining boric acid consists in first adjusting the pH of the solution at about 4-5, using methyl orange or methyl red as indicator, preferably the latter. This liberates free boric acid. If any other weak acids are present they are partially liberated, hence all such acids, such as carbonic, hydrofluoric, or citric must be absent, or high results and a poor end point will be obtained. Boric acid is too weak to titrate but it forms a stronger complex acid with mannitol, glycerine and certain other organic com-

pounds. One of these is added in excess and the complex acid titrated with standard alkali. The end point in this titration occurs at a pH of about 8, so that phenolphthalein is a satisfactory indicator. Other weak acids liberated in the preliminary operation will obviously be titrated also. This indicator cannot be used in the presence of nickel, the hydroxide of which begins to precipitate at a pH just under 7. If, however, the solution is saturated with mannitol, a condition which gives the strongest possible complex acid, the change in pH is rapid enough just below 7, so that a fairly good end point may be obtained with an indicator changing at this value, such as bromthymol blue. It should be noted that this is not the true end point, but a purely arbitrary one. This error may, however, be eliminated by standardizing the alkali against boric acid or borax under the same conditions.

To get a satisfactory end point the green color of the nickel must be neutralized by adding a complementary red. For this purpose, pure basic fuchsine from the National Aniline & Chemical Co. was found satisfactory. 0.027 g. was dissolved in 250 cc. ethyl alcohol, and for use this solution was diluted with an equal volume of water. The bromthymol blue and methyl red were 0.04 per cent and 0.02 per cent solutions respectively as purchased.

It is necessary to ascertain how much fuchsine solution is required by diluting 5 cc. of the nickel solution with water to the volume which it will have at the end of the titration (about 30 cc.) and adding fuchsine until the green color is just neutralized. For example, 0.75 g. $NiSO_4.6H_2O$ in 30 cc. required 4 drops. If the nickel solution contains much more than 150 g. $NiSO_4.6H_2O$ per liter, the fuchsine does not remove the green color satisfactorily and in such a case it is advisable to dilute 50 cc. of the solution to 100 cc. and use 5 cc. of the more dilute solution. If 5 cc. of the stronger solution were used the same effect would be obtained by diluting it so that it would have twice the volume after titration, but this would require more mannitol to keep the solution saturated. Either method may be used. In addition to the fuchsine required to decolorize the nickel, 0.7 cc. should be added to remove the green of 1 cc. of bromthymol blue. If fluoride is present it is precipitated as calcium fluoride by adding 4 drops of a 30 per cent solution of anhydrous calcium

chloride. A larger excess is undesirable because calcium sulfate is also precipitated. The solution should not be filtered.

If ammonium salts are present, the methyl red end point is distinct, but the bromthymol blue end point is not. This is because at such a high pH the alkali liberates some free ammonia from the salt. Where accurate results are not required, an approximate titration may be made by making up a standard nickel solution of the same composition, titrating with the proper amount of alkali, and using this color as a guide in subsequent titrations. It is better, however, to add a **saturated** solution of sodium hydroxide (which will be free from carbonate) equivalent to about 0.7 g. of pure hydroxide, boil 5 min. to remove the ammonia, acidify and proceed as in the absence of ammonia. In this way a sharp end point is obtained. If the alkaline solution is boiled in pyrex glass, some boric acid will be taken up from the glass. It is necessary, therefore, to use vessels of glass other than pyrex, or else porcelain or silica. It was noticed that some oxidizing material was formed during the boiling which decolorized the indicators. This was removed by adding potassium iodide to the acid solution and removing the free iodine formed by reducing it with a dilute sulfite solution, using starch as indicator.

Taking into account all these factors, the procedure is as follows if fluoride and ammonium salts are both present: Take 5 cc. of the solution containing not over 150 g. per liter of $NiSO_4.6H_2O$, or of the properly diluted solution if it is more concentrated than this, dilute to 20 cc., add 4 drops of 30 per cent $CaCl_2$, then carbonate free sodium hydroxide equivalent to 0.7 g. of the pure solid, boil 5 min. (not in pyrex glass), cool, acidify with conc. hydrochloric acid, add a few crystals of potassium iodide and let stand a few minutes. Add a few drops of starch solution, then 1 per cent sodium sulfite until the iodine is removed and one drop excess. Add a drop of methyl red, then sodium hydroxide until just alkaline—a yellowish green color—not colorless. Use concentrated alkali to keep the volume small. Add that amount of fuchsine which has previously been found sufficient to decolorize the nickel in the volume present at the end point, plus 0.7 cc. more, then 1 cc. of bromthymol blue, after which the solution

is titrated with 0.1 N sodium hydroxide, of which 1 cc. is equivalent to 0.006184 g. boric acid. The color changes from an orange through an indescribable gray color to a dark green and finally a dark blue green. One drop at this point produces a very noticeable change. Sometimes there is a tinge of red due to a slight excess of fuchsine. Another drop darkens the solution still more, but not as much as the one taken as the end point. Still more alkali gives a clear blue, but this is not as definite an end point as the bluish green. The color change is rather slow with the last few drops and 5-10 seconds should elapse between them to avoid overstepping the end point.

Sodium hydroxide solution is standardized by taking 10 cc. of 0.1 N boric acid (6.184 g. per liter), adding a drop of methyl red and sufficient alkali to give a yellow color. 4 g. of mannitol, 0.7 cc. fuchsine, and 1 cc. bromthymol blue are added. The solution is titrated to a deep blue color.

If ammonium salts are not present the boiling with sodium hydroxide is omitted and the procedure begins with the neutralization using methyl red. If citrate is present, the above method will not work. It is necessary to remove the citrate which can be done by evaporating to dryness the nickel solution made alkaline with sodium carbonate or hydroxide, igniting, and fusing with sodium peroxide. Or, the residue may be ignited in the air. This process is tedious and needs further work to establish the proper conditions, but no simpler method has yet been found.

The presence of ions of strong acids such as sulfate and chloride, does not interfere in any way; neither do alkali metals, magnesium, manganese, zinc, cadmium, and small amounts of iron. Organic addition agents as a rule are present in such small amounts as not to interfere. Citrate is, therefore, the only interfering substance which is difficult to remove. It should be rememebred that carbonate or carbon dioxide also interferes but this is not likely to be present except in the sodium hydroxide added to remove ammonia or absorbd by it during this process. Its presence or the presence of any other weak acid is shown by an indistinct and gradual change of color in the methyl red neutralization. Proper precautions will prevent serious interference from carbonate.

PITTSBURGH INDUSTRIES CO-OPERATE WITH ELECTROCHEMISTS

In conjunction with the fall meeting of the American Electrochemical Society to be held at Pittsburgh, Pa., September 19th, 20th and 21st, a number of the industries in the Pittsburgh district have co-operated with the American Electrochemical Society, extending to its members the courtesy of a personally conducted tour through their plants.

Special trips will be arranged to the works of the following:

Westinghouse Electric & Mfg. Company
Firth Sterling Steel Company
National Tube Company
U. S. Aluminum Company
Duquesne Light Company
Carnegie Steel Company
Pittsburgh Coal Company
U. S. Light Storage Battery Company
Jones & Laughlin Steel Corporation
Lustro Coated Steel Company
Standard Steel Spring Company
National Casket Company

In addition to these plant visits, the meeting will consist of a number of technical sessions, sight-seeing tours, golf and a special program for the ladies.

There will be special sessions devoted to a symposium on "Contributions of Electrochemists to Aeronautics," "Electrothermics," and "Electrodeposition."

(Complete list of technical papers accepted to date, is enclosed.)

There will also be an exhibit of recently developed apparatus and electrochemical products.

SECRETARY'S NOTICE

The complete report of the Detroit Convention containing all the papers and the discussions on the same have been compiled and mimeographed in one volume and mailed to all those who had ordered same at the Detroit Convention, and any of our members who desire a copy should send in their order to the Secretary, Geo. Gehling, 5001 Edmund St., Philadelphia, Pa., at once as there are only a few more copies available.

THE BARREL BURNISHING OF METAL PRODUCTS*

History—Mr. LeRoy Beaver, Member Philadelphia Branch

The barrel method of finishing metal products and which is variously termed as rumbling, tumbling, tubbing and burnishing, undoubtedly originated in England about the year 1900. As near as can be learned, the originator of the prcoess was a man named Edmunds. The moving thought in his conception of the method is interesting and the story is that, in observing the operation of a revolving cylindrical screen at a trap rock quarry, he was impressed with the brightly polished wire screen on the inner side of the drum, and he probably reasoned that, if a screen could be brightly polished of itself, why not metallic articles when placed in a cylinder together with some suitable material and revolved, also take on a bright finish equal to that produced on the inner or contact surface of the revolving screen drum.

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*Philadelphia Branch, 1929; Souvenir Year Book.

Edmunds

There is some slight conflict as to the approximate date of the first use of a barrel for this purpose in the United States. Undoubtedly, imported barrels of the Edmunds type were first, and these were of the oscillating type. The earliest record of the Edmunds barrel in the United States comes from the Improved Seamless Wire Company, Providence, R. I. This company, in July, 1903, purchased eight Edmunds burnishing machines in Birmingham, England. The first two of these machines were received in this country in September, 1903. They were immediately set up on the floor of the United Wire and Supply Company, also of Providence, R. I., where prospective users were invited to bring sample parts for demonstration.

Barton

Our next reference brings us to the Barton brothers, Harvey and Everett. Early in 1904 they produced a two-cylinder barrel of the type now largely used in the jewelry trade and known as a tubbing machine for the reason that the soapy water, used as a lubricant in the process, was carried in an outer tub, while the barrel revolving within the tub was perforated to permit of easy ingress and egress of the soapy

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*1928-Sov. Year Book.

water. The barrels of this machine were corrugated on the inner sides to provide for break-up or churning of the mass within the barrel when in operation. This type of barrel was the forerunner of the present day Smith-Richardson tubbing machine.

Baird

The next barrel development came about the year 1907, when the Warner brothers, Charles L. and Burton, originated what is now very generally and favorably known as the Baird Burnishing Machine.

Abbott

George E. Abbott, after considerable experimental work, developed three different barrels. The first two, after exhaustive tests, were discarded. The final type, which is exemplified in the present day Abbott Burnishing Barrel, was perfected in the year 1910, and is substantially the same as the present Abbott Barrel.

Aside from the above, and they may all be recognized at least in a large sense as having contributed materially in the development of the art in this country, there were and are smaller producers of burnishing barrels, all of them following in some degree the leads supplied by the above who are the real pioneers in the practice of the art.

In all of the above barrels speeds of from 30 r. p. m. to 60 r. p. m. were variously recommended. They are in every sense, with the possible exception of the Baird Machine, tumbling barrels in the generally understood acceptance of that term. Inasmuch as we are not at this time concerned with grinding or cutting down processes, we will not dwell on the various types of barrels generally used for that work. There is, however, a very clear distinction to be drawn between cutting down, tumbling and burnishing.

The practice most widely adopted in our various fields of production of metal products is the tumbling method, which is an intermediate method between the initial grinding and the final burnishing. For this work either a wood barrel or a cast iron barrel lined with wood, preferably hard maple, is used. The general practice has been to use round balls for the burnishing mass, and the story of the adoption of balls is also interesting, due to the fact that it goes back to Edmunds and the first known tumbling barrel. We are told that, in seeking

for some suitable material for carrying out his process which would have the greatest element of permanency and which could be used over and over again, he hit upon reject steel bearing balls or cycle balls, as they were termed at that time. The Hoffman Manufacturing Company, of Chelmsford, England, were, at that time, the world's largest producers of round steel balls. It was from this source that the first steel burnishing balls came and the reason for their use, undoubtedly, was due to the fact that they were the most readily available form of material that offered the permanency he sought. The use of round steel balls has been followed down through the years with only sporadic attempts to originate any new and more efficient burnishing mediums until about three years ago.

In a previous discussion of this subject and of the most efficient mediums for carrying out the process, the point was advanced that neither in theory nor in practice could any round ball be forced into an angle or into a groove smaller than its own diameter and that something more was required to satisfactorily complete the process in which the round balls could only perform a certain part. That the thought of some other form of material is not new is evidenced by the efforts of Wenger, England, 1912, and later of Thomas DeVilbiss, United States, 1915, followed by Abbott and later more thoroughly and comprehensively brought out by Beaver.

If it is true that a perfect sphere offers the least resistance of any solid body, then it must be equally true that aside from its sphericity, such a sphere cannot be the most effective medium for burnishing work, because we require a material offering greater rather than less, resistance.

A very simple test can be made of the theory by plunging your hand first into a barrel of round balls and then into a barrel of mixed materials composed of balcones, diagonals and finbals. You will immediately sense the greater resistance of the irregular forms as compared with balls only, and so in addition to their greater value in reaching irregular angles and grooves of the parts to be burnished, they also provide a materially greater resistance to the parts passing through the burnishing mass, hence more thorough and faster work.

A careful digest of practically all the available literature on the subject, consisting of articles in the trade press, catalogs,

pamphlets, advertisements, etc., discloses no conception of operation of the process other than to use two parts of burnishing materials to one part of work to be burnished, cover the entire mass of burnishing material and work with water, throw in a handful or more of soap and proceed. Now it must be obvious that no such hard and fast rule can be laid down. While it is true that there are many kind of products where the above rule will apply, it is equally true that there are as many more where it will not. We have in mind a maker of candlesticks and if he were to adopt this theory of two pails of burnishing material to one pail of candlesticks, we need hardly comment on the disastrous results, and especially if the barrels were operated at a speed of from 30 r. p. m. to 60 r. p. m.

In all of the available material examined in the course of preparation of this paper, there is no record of any maker of burnishing barrels ever advancing the theory that an operation fully equivalent to buffing can be as well accomplished by the barrel method as by handling the articles against a buff wheel. Let us examine this phase of the subject briefly. In buffing with a wheel, a fine abrasive polishing agent is applied to the buff, and the articles to be burnished are in turn presented against the buff where by the rapid revolution of the buff, carrying its polishing medium, a high lustre is produced wherein a small part at least of the surface is carried away so as to reduce the range of the high lights to the equivalent range of the low lights or background, and in this manner to produce a surface area where the light rays are more evenly refracted. In other words, to produce a polished or burnished surface.

Now suppose we take the conventional metallic burnishing material mass, adding the customary soap and water, but advancing further than this we add a quantity of the abrasive polishing medium identical with that used on the buff, and this should be what we might term a soft polishing abrasive as distinguished from a hard or cutting abrasive, such as vienna lime, or any one of several other materials of like characteristics and which would then be carried in suspension within the polishing mass. In operating the barrel all of the elements of pressure are present that can be found in a hand buffing operation against a wheel except that the pressure is

more evenly distributed and is more constant in degree. Less material will be required to be removed by the metallic mass in conjunction with the polishing abrasive because in addition to the operation of the abrasive burnishing compound acting in conjunction with the burnishing mass itself, we have a constant rolling or rubbing pressure equal from every angle due to the complete immersion of the parts within the burnishing mass. This rolling rubbing pressure having a great tendency to equalize the surface area by pressure rather than by removal of any part of the surface of the materials being burnished. Generally speaking, by the adoption of a slower barrel speed we can accomplish by pressure from within the mass all or substantially all that might be accomplished by the buffing method, but with the removal of less surface, which naturally tends to longer life of the plated surface. Instead of removing any appreciable part of the plate, by this method we roll the plate to an even denser degree upon the base metal.

Some of the early articles published on the subject, when considered in the light of what we have later learned, are interesting, as the following extracts indicate:

Brass World—October, 1906

"Operate the barrel at 50 r. p. m. Although the polishing action will take place if only a few balls are used, it is false economy to use too small a number. It matters not what the shape of the barrel is, although a hexagon barrel is better suited to *stir up the work*."

Brass World—March, 1909

"In using steel balls for burnishing, *all that is necessary* to do is to have a suitable tumbling barrel (a horizontal one is required) and to place the work to be tumbled in the barrel with a sufficient number of balls. The less balls there are the longer the polishing will take, so that it is poor judgment to attempt to economize on balls."

American Machinist—April, 1910

"The process consists in placing the work in a tumbling barrel, preferably of wood and of the horizontal type, so as to prevent scratching of the work against the sides of the barrel, and then *dumping* into the barrel a large quantity of small steel balls measuring in bulk about twice that of the work to be burnished together with a soap mixture, in which

the work and the balls are confined or held together so that as the barrel rotates, the whole mass of soap work and balls is tumbled about, causing the balls to be forced in all directions across all of the work surfaces, thus giving a constant burnishing action. The process takes the place of buffing both before and after plating on such articles as electrical goods, chains, buttons, thimbles, typewriter parts and other parts.

"Naturally, when we consider using, say a couple of pecks of balls for the burnishing of thimbles or other small parts a peck at a time, the question of expense will come to mind instantly and lead us to wonder how the process can be an economical one even though the balls are used over and over again."

Barrel Burnishing Defined

Barrel burnishing is a process for polishing metal products either plain or variously plated and to produce either a smooth surface prior to plating or a brilliant finish after plating. The process simply described consists of subjecting the article to be burnished to rotation within a burnishing medium and producing this rotation while the article is suspended in the burnishing medium.

This means the article to be burnished is actually rotated within the burnishing mass, while suspended in that mass, that is to say, that it is not substantially displaced radially from approximately the central position. In other words, the articles are rotated while continuously held approximately central of the mass, and excludes a condition where the articles pass into and out of the mass, that is, where the articles being burnished are sometimes within and sometimes without the mass.

Barrel burnishing (and you will note this distinguishing term as compared to ball burnishing) is a process and not a piece of mechanical equipment. For carrying on the process an apparatus is required consisting preferably of a polygonal drum or barrel, which is subjected to rotation by some driving mechanism, the drum or barrel in turn subjecting the burnishing mass therein to rotation and the burnishing mass subjecting the articles within it to rotation.

Relation of Specific Gravity

Three elements enter into the process. (1) The speed of

rotation of the burnishing mass, relative to the size and shape of the articles being burnished, the movement of the mass being such as to affect only a restrained and slow displacement along the surfaces of the parts being burnished and so as not to dislodge them radially during rotation. (2) The relative specific gravity of the burnishing mass and of the articles to be burnished, a relation which is always present, and (3) The relative quantity of the burnishing mass to the size and shape of the articles to be burnished. In regard to the quantity of the burnishing mass in order that the process shall be carried out to the best advantage, it should be such that the parts to be burnished are substantially covered by the burnishing mass during rotation.

Now, in order to illustrate the foregoing proposition, let us take two articles widely apart in characteristics and we can best illustrate this by a composition billiard ball for the one extreme and a chrome alloy steel ball for the other, both the billiard ball and the steel ball being on the same diameter, viz., 2¼ inch. The barrel for the demonstration being of the regulation polygonal form, 17 inches in diameter and 24 inches long, having plate glass ends, and carrying a load of 480 inches of burnishing mass comprised of ⅛ inch, $\frac{5}{32}$ inch and $\frac{3}{16}$ inch round steel balls in equal proportions, which filled the barrel to slightly more than two-thirds full. On the initial test the barrel was operated at a speed of 10 r. p. m., giving a peripheral speed of 23.6 feet per minute, and in the second test at 18 r. p. m., giving a peripheral speed of 58.6 feet per minute. The specific gravity of the above burnishing mass was 4.9, that of the billiard ball 1.7 and of the steel ball 7.8. You will note that the specific gravity of the billiard ball was materially less and of the steel ball materially more than that of the burnishing mass itself.

In both tests and at both speeds the billiard ball and the steel ball were placed in the same relative position deep within the burnishing mass, though the tests were conducted separately. Observing the operation, it was noted that the billiard ball was carried up to the surface of the mass and then rolled down the inclined plane of the mass to the side of the barrel, where it floated on the surface of the burnishing mass. In this same manner the steel ball was rotated within the burnishing mass, and at no time did it come to the surface

of the mass, but was continuously under pressure within the mass.

If the relation of specific gravity of the articles to be burnished to that of the burnishing mass had no bearing on the subject, then the lighter billiard ball would have maintained the same relative position within the burnishing mass as the steel bearing ball, since they were both spheres, were both placed in the same relative position and operated upon in the same way. The theory, therefore, of the relation of specific gravity of the articles being burnished and of the burnishing mass is a demonstrated scientific fact.

A burnishing mass, though mobile, is not liquid. It exerts great pressure both when at rest and when in motion. When at rest it is difficult to force one's hand through the mass to the bottom of the barrel. Now the mass not being liquid, the billiard balls, and like articles whose specific gravity is materially less than that of the burnishing mass, do not float or burst to the surface by reason of any buoyancy, but are impelled to the surface by a force produced within the mass itself during rotation.

There are many forces operating on the articles within the burnishing mass, which, at a given instant, in mechanical parlance, are all resolved into one final or resultant force. It is this force—the resultant of all the forces—which impels the articles of lesser specific gravity to the surface of the burnishing mass, and they are never again able to regain a position within the mass. Such articles are unable to resist this force because of insufficient inertia. If they had greater specific gravity, hence greater inertia, they would be correspondingly better able to resist this resultant force. Articles of greater specific gravity than that of the burnishing mass are able to resist the force and hence to retain their position within the burnishing mass. Hence it is that the specific gravity of the articles to be burnished, or to put it in another way, the inertia of the articles, is a distinct factor in their resistance to the force trying to dislodge them.

Now let us take for example this 2¼-inch steel bearing ball weighing 1.676 pounds. The resultant force to which I have referred is a force which would produce on this ball a motion of rotation of the ball about its axis and also a motion of

translation or dislodgement. This is because the resultant force so operating on the ball does not pass through the centre of gravity of the ball. If it did only one motion would be produced, viz., translation or dislodgement in line with the direction of the resultant force.

We find, too, that in following out these conclusions that any article of approximately perfect sphericity is better able to resist the force of dislodgement than any irregular shaped piece. This is more readily appreciated when it is considered that the stream of burnishing mass, acting upon projections or irregular portions of the articles being burnished, is inclined to throw them out of position, while in the case of a perfect sphere no such irregularities are presented; but perfect symmetry alone will not enable the articles to remain within the burnishing mass. This is amply demonstrated by the test on the lighter specific gravity billiard ball, which, due to insufficient inertia or specific gravity, was forced entirely out of the burnishing mass by the resultant force.

There are certain exceptions that may well be noted. We find in the case of hollow shells of various metals that, when placed in the barrel they are immediately filled with the burnishing mass, hence the specific gravity of such shells is not the specific gravity of the shell itself but the resultant of the specific gravity of the shell and of the mass within the shell. This resultant specific gravity being greater than that of the burnishing mass in a material and not in a trifling degree contributes substantially to keeping such articles within the mass during rotation.

The extent of the resistance of the inertia of the articles to the resultant force of dislodgement is one of degree, dependent upon the extent of the force and the inertia. Even a slight addition to the inertia of an article may suffice to sway the result in favor of the article as against the resultant force and thereby retain it within the mass.

All of this brings us back to the character of the material composing the burnishing mass. There can be no adequate burnishing result without the resultant force of the friction of the mass against the articles being furnished. A true sphere offers the least resistance, an irregular burnishing piece offers substantially more resistance, hence its greater efficiency for burnishing work.

Relation of Speed

As between perfect spheres and irregularly shaped articles we have, on account of the symmetry of the sphere, a very different system of the combination of forces and impulses from what we would have acting in the case of more irregularly shaped articles. As the articles range away from the basis of the true sphere toward irregular shapes, an adjustment or control of the speed of the barrel must be exercised commensurate with the remoteness of the article from the true sphere. In other words, the more irregular the article, the more need for control or adjustment of the speed of the barrel. For example, a barrel operator may have a wide variety of shapes to burnish and it is safest for him to regulate the speed of his barrel, in order to avoid continual change of barrel speeds, to that speed at which the most difficult articles are best operated upon and this will generally be a comparatively low speed which will not dislodge the article from the burnishing mass. This low speed would be the one adopted for the more difficult pieces having a size and shape requiring a lower speed than the others. Other articles in this group could be burnished at a higher speed, but the comparatively lower speed, having been adopted for the more difficult articles, will be equally effective in the burnishing of the complete group.

Inasmuch as no hard and fast rule can be laid down regarding the proportion of burnishing mass to parts to be burnished, the best specification would be that the quantity of burnishing mass should always be such as to completely envelop the articles being burnished during rotation, and this, undoubtedly, is the most satisfactory rule to follow in carrying out the process.

Cleanliness

Unquestionably, the highest development of the barrel burnishing process is found in a machine and process known in the trade as the Tahara Silver Burnishing Machine. Tahara is a word of Arabic derivation, signifying "Cleanliness." If there is anything at all in the expression that "Cleanliness is next to Godliness," it has no more apt illustration or application than in the barrel burnishing of metal products. Irrespective of the kind and grade of soap used as a lubricant, we must note that the base is composed either of animal or vege-

table fats or oils, in other words, grease. This grease, with certain alkalies, constitutes soap. There is no commercial soap in general use that contains sufficient alkalies for proper burnishing work. Immediately the alkali is exhausted from the base, the resultant grease or oil is left in the burnishing mass and deposited as well over the entire surface of the inner side of the barrel. It can only be removed by some alkali sufficiently strong to dissolve it and cause it to emulsify so that it can be washed away. In order to secure satisfactory results, both inside of the barrel and the burnishing mass as well must be kept scrupulously clean.

Not only this, but the parts to be burnished of themselves should be in equally as clean a condition. No operator can expect to place dirty, greasy or tarnished parts into his burnishing barrel and expect satisfactory burnishing results.

CHAIRMAN SCOTT: Are there any questions you would like to ask Mr. Beaver? I think this subject is a very interesting one and an important one. We all have our troubles and our ideas about burnishing, and here we have a man who has made a study of it, and I am sure he would be glad to help you. So if you have any questions to ask Mr. Beaver, we will be glad to have them now.

MR. GEO. B. HOGABOOM: I haven't a question, but Mr. Beaver spoke of the history of the barrels. It may be of interest to know that they did burnishing for polishing in France in the fifties, in 1850, and I happen to have a copy of the original Rossileur in French, and in that are two cuts of burnishing barrels, one of them a hexagonal barrel, very similar to what is being used today, and rotated by hand; the other was the skin of a goat that was sewed and just oscillated, and they used metal parts in there to burnish metal pieces, small parts of buttons, or they used pieces of wood that were cut in an irregular shape, hard wood, and were rolled in that barrel. I thought that might be of interest to Mr. Beaver.

When Mr. Parsons was going to sue the Baird people for an infringement, Baird came up and had photostats made of that page, and the case was thrown out of court.

MR. BEAVER: I think at that time what Parsons claimed as a patent—I have gone into that to a considerable extent—Parsons claimed he was the originator of the use of a tumbling

barrel, that that was tumbling. What I have tried today, Mr. Hogaboom, was to draw a distinction between what we know as tumbling and what we should know as burnishing, because, take it this way—you have a triple revolution, first the revolution of the barrel itself, second the revolution of the burnishing mass within the barrel, third the revolution of the article to be burnished within the burnishing mass. Now, by controlling the speed of the barrel, and holding at a low speed, and by confining yourself to an article whose specific gravity is greater than the burnishing mass, that article will remain within the mass, and the mass will revolve around it, and it will never touch the side of the barrel.

MR. HOGABOOM: The explanation is very lucid, and the paper, I think, is the finest I have ever heard on the subject of barrel burnishing, but I thought you would be interested to know they did burnishing in a hexagonal barrel operated by hand, turning it like a peanut roaster in 1856.

"CHROMIUM PLATING"*

What We Have Learned From Sargent's Solution

By Charles H. Proctor

Two or three years ago an eminent professor stated publicly in the presence of many gentlemen possibly present at this meeting today and also in the author's presence that I wanted to be the "Lindbergh" of the chromium plating industry. Lindbergh never invented an aeroplane, he was only the "Lone Eagle of the Air" that gave the aeroplane industry a new birth because he had proven for all time what it was possible to accomplish with the aeroplane.

It was not the lust of gold that tempted him to make that dangerous but epic flight, it was for the love of the art of flying through the air as he saw it. Not for any reward, but what he accomplished, is a perpetual monument to him for all time and ages, and that alone, not the love of financial return, is his reward.

I am not a "Lindbergh." Shakespeare is responsible for the expression "What fools these mortals be." All that I have tried to do has been to substantiate the work accomplished by Carveth and Curry by Sargent and conserve the work

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*Philadelphia Branch, 1929; Souvenir Year Book.

they did for the benefit of America and the American industry without tribute in any form or under any circumstances no matter what they may be.

If, as the eminent professor stated, I wanted to be a "Lindbergh" in the chromium plating industry and he believed that statement to be true, then this tribute to him is the answer. Whenever necessity arises in America's metal fabricating industry, in America's electroplating industry, for a "Lindbergh," he, as well as others, will discover that I am ready to be the "Lindbergh."

If one desires all the information that it is possible to learn about chromium plating baths he will at once turn to that splendid work of Richard Schneidewind entitled "A Study of Patents"—dealing with the Electro Deposition of Chromium, issued in November, 1927. This splendid work is the "magna charta" of chromium plating. It is the declaration of commercial independence covering chromium plating in America. Then comes the Technologic Paper, or Bulletin No. 346, issued by the Department of Commerce, Bureau of Standards, entitled "Electro Deposition of Chromium From Chromic Acid Baths," by H. E. Haring and W. P. Borrows, June, 1927.

These gentlemen tell you in the abstract that the three principal types of chromic acid baths which have been developed during the past seventy years are shown to be identical, not only in the initial behavior, but also in the ultimate composition. The recent commercial success of chromium plating is, therefore, attributed not to any changes which have been effected in the composition of the bath but to its more careful operation and control.

It was found that minor improvements could be affected in the throwing power of chromic acid baths, but that there appears to be little possibility of materially improving this property which has hindered the more general adoption of chromium plating.

In the study of chromium plating baths by Haring and Barrows, Sargent's solution or bath was used as a basis. The compositions of the three types of baths experimented with were termed: "acid, neutral and basic." The composition was essentially the same for all three baths:

No. 1—Acid

Water .....1 litre
Chromic acid.....250 grams.
Sulphuric acid..... 2.5 grams.

No. 2—Neutral

Water .....1 litre
Chromic acid.....250 grams.
Chromic sulphate.. 3.3 grams.

No. 3—Basic

Water .....1 litre
Chromic acid.....250 grams.
Chromic sulphate.. 3.3 grams.
Chromic carbonate.. 5.9 grams.

The first bath is Carveth and Curry and the second Sargent's bath. They both contain 1 per cent sulphate in the form of sulphuric acid, so both baths are practically identical in composition.

The third bath is commonly termed the Bureau of Standards bath, the only essential difference from baths No. 1 and 2 is the addition of chromic carbonate to form in the bath, chromium chromate. As no mention was ever previously made covering the addition of chromic carbonate to any patented bath, the Bureau of Standards bath No. 3 can be considered essentially a Carveth and Curry and Sargent bath, so does not come under the category of patents.

Schneidewind states, on page 17 of his study of the Patent Situation, "Chromium chromate is not essential. Good results were due to anions in the earth." In his resume on page 19 he states it has been shown that the published, not patented, fundamental researches of Carveth and Curry and of Sargent are sufficient to teach one how to obtain good chromium plating.

Sargent's bath with different unessential modifications is the basis for a large number of patents applied for subsequently. It would be found that many patents not only infringe upon each other, but in some cases attempt to cover bath compositions published twenty and thirty years previously.

Sargent's work was completed a good few years before 1920, although his investigations were not published until 1920. Carveth and Curry investigations were carried out in 1905 at Cornell University. Sargent's investigations were also carried out there and as you all know were financed by Carveth and Curry in part. Sargent noted that the previous investigators (Carveth and Curry) had apparently found that the efficiency of chromium deposits from chromic acid baths

containing sulphuric acid tended to increase the electrolysis. He believed that this increase in efficiency was due to the gradual replacement of the sulphuric acid by chromic sulphate as the result of electrolytic reduction. Although Sargent logically concluded that it was advisable to make additions of chromic sulphate to the chromic acid bath initially, hundreds of chromium platers today in the commercial chromium plating field of operation have learned by experience, that great teacher of facts, that the most efficient and most soluble sulphate factor is sulphuric acid and that the addition of this acid to the chromic acid solution, under electrolysis, immediately forms chromic sulphate in the bath as soon as it is in operation and it is not necessary to wait an extended period of time for electrolysis to accomplish the formation of chromic sulphate in the bath, as Sargent surmised, but it is immediate.

It is no wonder as we look back nearly a quarter of a century that the statements made by Carveth and Curry are absolutely true and that they did obtain fine platings, platings made without the stirring of the solution and without finishing by buffing that resembled the very finest work done in silver.

In fact for plating purposes the metal should have a great future before it. This was a prophetic statement—a vision of today. And America stands first and foremost in all the world in chromium plating as it does in every other industry —always in the first ranks. You can feel the red blood surge through your veins when you say—I am an American—as I did in Europe a few months ago, and you can sing "My Country 'Tis of Thee, Sweet Land of Liberty, I Sing" and you know it is true.

The prophetic statement of Carveth and Curry has come to pass, the blue white metal chromium has not reached its zenith, but behold the automobile industry, with the proud Cadillac and other equally distinguished automobiles, have adorned the blue white and silks and satins of chromium, their lowly brother, the Oldsmobile, having been adorned with it a few years ago. I was told only two or three years ago that chromium would not be applied to the exposed metal parts of high priced cars, such as the Cadillac, Packard, Studebaker, Chrysler and many others, but it has come to pass that every automobile in the country manufactured from now

on will have chromium plated trimmings. On every hand you behold chromium plated deposits. It is used extensively in the jewelry and watch manufacturing trade, yet the value of the metal deposited does not exceed that of the cost of nickel. We see the deposit in all lines of plumbers' hardware, in the electric lighting fixture industry.

On numerous products used in the home. The stove and range industry is getting ready to deposit the metal and all because it is like the diamond—blue white—it glistens in the sunlight and Mother Nature's varying moods do not dull its permanent lustre and the future will still see chromium used more and more.

Carveth and Curry and Sargent have made this condition in the American metal fabricating industry commercially possible. There are hundreds of American Electroplaters that have helped to bring chromium plating to its present basis because they had a belief in its future. I have had continued faith in commercial chromium plating and have helped to be the "Lindbergh" that the eminent professor tried to infer that I wanted to be.

The solutions that I have advocated, based upon Carveth and Curry and Sargent's investigations, together with the addition of natural chromate of iron added as the chromate factor, have produced splendid results. A couple of months ago I visited a plant where the auto bumpers for the Cadillac automobile are manufactured and finished. Chromium plated Cadillac automobile bumpers must be good bumpers and must stand up under rigid inspection, the same as Cadillac cars do. I wrote up all the details for the chromium solutions. When I visited the plant months ago they had passed their 20,000 bumper mark and I was advised that the total rejections were only 80 bumpers out of the entire 20,000. A fairly good record for commercial solution, and so the story could be told from all over the United States, that the chromic acid, chromate of iron, sulphuric acid solution, has given the maximum of efficiency and productive results.

I have learned a good deal from Sargent's basic proportion solution established in grams per litre and ounces per gallon, with a solution prepared upon the following basis:

Water	1	gallon
Chromic acid	48	ounces

Natural chromate of iron... 1½ ounces
Sulphuric acid 60° ..... ½ ounce

At 6 volts at the tank and 100 to 125 amperes per square foot of surface area, at 110° Fahr. THERMOSTATIC CONTROLLER, with the anodes of 90 per cent mild soft steel and 10 per cent lead anodes. The total anode surface to equal a minimum of three to one as compared with the cathode surface. The maximum results possible to obtain have been secured with this type of solution in plating all types of metal products previously nickel plated with an adherent bright and clean and polished deposit of nickel.

But it is not always necessary to use the maximum proportions of materials in chromic acid, chromate of iron sulphuric acid solutions. Proportionately you can use a 32 ounces, a 24 ounces, a 16 ounces and 8 ounces chromic acid basis.

For chromium plating high carbon steel tools and dies the minimum solution gives the maximum results in throwing power, hardness and brightness of deposit. This has been proven for more than a year in one of the largest automobile plants in the country. The formula is as follows:

Water ..... 1 gallon
Chromic acid ..... 8 ounces
Natural chromate of iron.....¼ ounce
Sulphuric acid 60°.....$\frac{1}{12}$ ounce

Anodes of soft sheet steel. Voltage—3½ to 4. Temperature —125° Fahr. Minimum. It will be found that this minimum solution will deposit chromium as rapidly as the maximum solution—bright and extremely hard. A solution that I have recently experimented with primarily for chromium plate direct upon brass is as follows:

Water ..... 1 gallon
Chromic acid ..... 8 ounces
Pure zinc sulphate..... 1-5 ounce
Sulphuric acid 60°.....1-60 ounce

In other words for every ounce of chromic acid used in preparing the solution then add ¾ gram. of pure zinc sulphate of 1-20 ounce. Anodes of sheet steel should be used. This solution can be operated at 3½ to 4 volts at 110° Fahr. minimum, and amperage consistent with a good bright deposit —100 to 125 amperes per square foot. In operation of any

chromium plating solution of the commercial type it is necessary to keep the sulphate factor constant. It makes no difference whether 8 ounces of chromic acid or 48 ounces is used in the preparation of the solution. If the solution is constantly operated under production the addition of from 1-60 ounce or one-half C. C. of sulphuric acid to the minimum solution will be required, up to the maximum of 1-30 ounce per gallon per day or one C. C. for the 48-ounce solution.

I have discovered that when detailed surfaces are hard to cover, especially with deep backgrounds, if, after cleansing the articles under usual conditions they are then immersed in a one part muratic acid to three parts water solution and then not rewashed in water, but placed directly in the chromium plating solution, deposit of chromium results over the entire article in a moment. Apparently the cathode surface becomes momentarily passive under the influence of the liberation of the chlorine.

I do not advocate the muriatic acid treatment for articles plated in the chromic acid, zinc sulphate solution, as evidently the zinc in this type of solution produces similar results at the cathode.

You and I and hundreds of others have learned a great deal from Sargent's solution. It has established a prior art in commercial chromium plating. Carveth and Curry established the facts.

But it is the American Electroplater that has established the chromium plating industry as it stands today in America. It is to his knowledge gained by the great master, practical application, in other lines of electro plating, that has enabled the chromium plating industry to stand where it stands today —"Foremost in the World"—and will continue to do so just as long as necessity may demand.

NOTE—

Analysis of Iron Chromate

Cromic Oxide $Cr_2 O_3$	48 50 per cent
Ferric Oxide Fe O	20-25 per cent
Silicon Oxide Si O_2	4-7 per cent
Magnesium Oxide Mg O	12-14 per cent
Aluminum Oxide $Al_2 o_3$	7-10 per cent

(Mr. Proctor distributes some material he plated with chromium, for the examination of the members.)

MR. PROCTOR: Now this (shows) is a die casting, of course, polished, finished and cleansed in the usual way. Then nickel plated and buffed, and then plated in the chromium solution I have mentioned—I want to call your attention to this (shows piece)—eight ounces of chromic acid solution, with three-quarters of an ounce of zinc. Of course, you must realize I have no facilities at our plant. I go down to our Research Division, and while the boys are working on some other problem I play, as I have done for years, and I play with things. I don't know that I always discover something that is absolutely correct, but anyway, it leads the way to higher and better things.

These two pieces here (shows) are plated with the chromic acid, eight ounces, and zinc sulphate ¾ gram. These other pieces (shows) were plated with the eight-ounce solution, with the iron, and one-fourth of an ounce of chromate of iron and one-twelfth of an ounce of chromic acid. Here are some (shows) that were plated with the twelve-ounce solution, and here are some (shows) turned out for Ford, and you know anybody that plates for Ford has to get down to cases.

Now those are some of the product just as it comes out of the bath. I brought some screws here because you know sometimes we think it is pretty darned hard to plate a radiator shell, but I am going to tell you, gentlemen, it is a darned sight harder to plate screws. I don't mean to plate them, but I mean to get the chromium in the head of the screw, and to every part of the screw so it is covered completely and you can't see any nickel underneath. And these were plated with the 48-ounce solution, as you see, right on the wires.

So when we come to chromium plating, as I said before, while I am always glad to say something to you about the subject, and I think perhaps I ought to be pretty near the end of the line, it is for you to decide what you want to do. I have been traveling for a month in the Middle West, visiting some of the greatest plants in the country, and they are doing wonderful work. I could tell you lots of stories that might be detrimental to some of the other processes. I am not going to do it. I want you to depend upon yourself. If you think that chromium plating as we have tried to establish it for

you is a commercial proposition, then, gentlemen, it is for you to decide. It is immaterial to me whatever you do. But I think after all, when we consider all the work that is done by Americans, and when I was in Europe a couple months last summer, I saw but one automobile that was plated with chromium, and that was the new Chrysler, that recently came over chromium plated. I saw some plumbers' hardware—and we wouldn't consider such material as they plated in England or other countries, compared with what we see back here. They have patterned after our results here in America and haven't yet reached our standards.

TENTATIVE REPORT

Electroplaters Conference, April 6th, 1929
Newark, N. J.

Dr. Blum outlined the work of the bureau, stating that a full report of the conference would be printed and sent to each member of the A. E. S. The research fund is about depleted. There is enough money until the end of this year. It was thought that an appeal to the manufacturers to renew their subscriptions should not be made until the report on "Spotting Out," which has been completed by Mr. W. P. Barrows had been received. These reports will be sent out not later than June.

Spotting Out

Mr. W. P. Barrows, research associate A. E. S., reported that his work on Spotting Out has been finished. Of the two kinds of spots "Stain Spots" and "Crystal Spots" he said; the former were mostly due to the alkali solutions used in cleaning and finishing settling in the pores of the casting and stampings, the latter are the result or growth of spots where sulphur is found. No positive prevention of Spotting Out was discovered. The following suggestions were recommended:

1. Secure porous free castings or stamping if possible.
2. Stay away from alkali cleaners, use acid copper instead of cyanide copper.
3. Allow the work to dry out 24 hours after plating before finishing.
4. Use a lacquer impervious to moisture.
5. An oil film of petrolatum and carbontetrachloride over the lacquer will retard the growth of crystal spots.
6. Wrap in wax paper and do not use rubber bands.

Mr. Hanlon suggested baking the parts to be finished from 50 to 300 degrees F. and allowing to cool in the oven before finishing.

Dr. Graham warned against grinding of casting as they usually produce more pores.

THROWING POWER OF CHROMIUM

Important points on throwing power from Mr. H. L. Faber, research associate of A. E. S., at the Bureau of Standards are:

1. The use of anodes shaped to conform with the work, properly spaced and shields to make an even distribution of current over the cathode surface.

2. If 10-12 volts are available

Formula	FM/L	Oz./Gal.
cr 0_3	250	33
$H_2 S 0_4$	1.25	.16

3. At 5-6 volts.

Temp. 13/ degrees F., 280 amperes/sq. ft.

Formula	GM/L	Oz./Gal.
cr 0_3	400	53
$H_2(S 0_4)$	2	0.27

Temp. 104 degrees F., 56 amperes/sq. ft.

The above formula gives maximum throwing power at the given conditions.

Analysis of Cyanide Solutions:

R. M. Thompson, of Bureau of Standards, in a progress report recommended the "Leibig" titration with ag No^3 and KI as indicator giving the yellow cloudy end point as reliable for cyanide solutions.

Ph Measurement of Nickel Solutions

In Dr. Blum's outline of the investigation it was stated about forty nickel plating solutions were made up at the Bureau of Standards and sent to the following men for measurement:

N. Bekkedahl (Bureau of Standards).
K. Pitschiner (American Chain Co.).
C. J. Rosecranz (Leeds & Northrup).
F. R. McCrumb (La Motte Chemical Products Co.).
A. K. Graham (University of Pennsylvania).
J. T. Burt. Gerrans (University of Toronto).

Of the three methods of measurement, namely, the Hydrogen electrode, "quinhydrone electrode and the colormetric methods there is a difference of about .5 of a Ph.

e.g.	Ph
If measured with hydrogen electrode	5.4
If measured with quinhydrone electrode	5.43
If measured with colormetric	5.9

Therefore if the hydrogen electrode was accepted as a standard there would be a difference of about .5 Ph between the colormetric method and the others. Dr. Blum suggested to take your reading and make the correction mentally.

Dr. A. K. Graham disagreed with Dr. Blum stating it would only complicate matters.

Nothing should be done until the situation can be cleared up more

satisfactorily. Dr. Graham illustrated with the following table the various changes in Ph with concentration and temperature.

	N	N	M	N	PH	Decrease in Ph above 25 deg. C	
					25	40	55
	$NiSO_4$	NH_4Cl	H_3BO_3	$(NH_4)_2SO_4$	deg. C	deg. C	deg. C
1	1	.25	.25	..	5.85	.15	.35
2	0.5	.25	.25	..	6.1	.2	.4
3	2.	.25	.25	..	5.8	.1	.5
4	1.	..	.25	..	6.1	.0	.0
5	1.	.25	..	..	5.9	.4	.6
6	1.	..	.25	.25	5.9	.25	.4

No. 4 showed where ammonia was not used the PH did not change.

No. 5 shows a greater change in PH takes place when H_3BO_3 is not used.

No. 7 Copper Electrotype Solution

R. O. Hull, research associate of the International Electrotypers Association, recommended the following:

Formula	Oz./Gal.
cu SO_4	33
H_2SO_4	10
Carbolic Acid	.13 added is phenol-sulphonic acid.

Temp. 104 degrees F. CO 280 amperes 1 sq. ft.

Iron Deposition

C. T. Thomas, Bureau of Engraving and Printing, recommended the following:

Formula	Oz./Gal.
Ferrous chloride $FeCl_2\ 4H_2O$	40
Calcium chloride $CaCl_2$	45
Free H cl about .01	.02 normal

Temp. 196 degrees F. CD 65 A/ sq. ft.

A deposit of .003" per hour can be obtained, anodes are hung in a porous alundum pot. The deposit has a tensile strength of 56000 lb./sq. in. and an elongation of 20%.

AL HIRSCH, PHIL UHL, GEO GEHLING, representatives of Philadelphia Branch.

BALTIMORE-WASHINGTON BRANCH

A meeting was held in the Enoch Pratt Library, Calhoun and Hollins Streets, Baltimore, Saturday, June 29, President M. J. Kraft, presiding.

Delegates from this branch attending the Detroit Convention were requested to use their own judgment in voting.

Delegates to offer Washington as headquarters for the 1930 Convention.

Next meeting, August 31, at the Bureau of Standards, Washington.

Geo. F. P. Turner, Secretary.

BOSTON BRANCH

Boston Branch met Friday the 14th, at the Boston Platers Supply Co., 101 Haverhill St., Boston.

With President Wright in the chair the regular order of business was gone through. The election of officers was put over until September.

Twelve applications were received for membership and were referred to the board of managers.

Boston Branch expects to hold more open meetings hereafter, as the branch has opened a drive for members.

Delegates to the convention will be Louis A. Gale and B. F. Lee.

The meeting adjourned at 10 p. m.

A. W. Garrett, Secretary.

CHICAGO BRANCH

The regular monthly meeting of the Chicago Branch was held Saturday, July 13, 1929, at Atlantic Hotel. The meeting was called to order by Pres. Samuel J. C. Trapp. Due to the hot weather the attendance was not so good, there being only 30 members present.

The reports of the convention were held over until the next meeting, August 10, 1929. There being no further business the meeting was turnd over to the librarian.

Our regular librarian not being present, Past President H. A. Gilbertson took his place and the following questions were found in the question box:

Ques. 1: Is it advisable to use carbonate of soda in a brass solu.?

Ans. 1: It is not advisable to add carbonates after a solu. is made up. Carbonates are formed during the process of plating.

Ques. 2: Do you know of a good electric strip for nickel plate on steel parts? What voltage should be used?

Ans. 2: Reduce commercial sulphuric acid to 55° Baume with water. Use reverse current and lead anodes 4 to 6 volts.

Correcting error in report of June—Mr. E. Hilliard died instead of being suspended.

J. C. Kretschmer, Secretary and Treasurer.

HARTFORD-CONNECTICUT VALLEY BRANCH

Hartford-Connecticut Valley Branch, A. E. S., held its regular meeting at the Springfield Chamber of Commerce, Springfield, Mass., on Monday evening, June 24, 1929.

The meeting was called to order at 8:30 p. m., with President Beloin in the chair. Minutes of the previous meeting were read and approved. All communications were read and placed on file and all bills were ordered paid. It was voted to hold no meetings during the months of July and August.

Delegates were instructed as to how to vote in regard to business at the National Convention.

Mr. E. M. Stephenson was introduced and gave a talk on Unique Lacquer Finishes. His talk and samples of finishes connected with it were of much interest. In conclusion he was given a rising vote of thanks.

The meeting was attended by 19 members and visitors, and was adjourned at 10:30 p. m.

V. E. Grant, Secretary.

NEWARK BRANCH

The regular meeting of the A. E. S., Newark Branch, held at 41 Franklin St., Newark, N. J., Friday evening, May 19, 1929, with President George Wagner presiding.

Minutes of the previous meeting were read and approved.

The nomination and election of the officers for the year of 1929-1930. The results of the electrion were as follows: President, William De Vote; vice president, P. Caberbrase; secretary and treasurer, George Reuter; librarian, P. Aldam; sergeant-at-arms, D. Darives; trustees, George Wagner, Mr. Harrison, Mr. Dondi.

Delegates to Convention—Mr. Sigelove, Mr. Sivering, Mr. Smith.

Alternates—Mr. DeVote, Mr. Wagner, Mr. Clark.

Mr. H. Smith introduced the speaker for the evening, Mr. A. P. Munning.

Mr. Munning's subject was "Plating and Plating Conditions in Japan; How Do Job Shops Compare Between Those in Japan and Those in the United States?"

Mr. Munning's talk was very interesting throughout and was extremely instructive, telling of his various experiences during his three-year stay.

TORONTO BRANCH

The regular monthly meeting of the Toronto Branch was held Monday, June 24, in the Canadian Foresters Hall, President J. Walker presiding.

The auditors' report for the fiscal year just ended was read, which showed a very substantial balance.

Considerable time was devoted to a discussion of the revised constiution of the society. Following this a general discussion arose regarding the merits and demerits of chromium, particularly in the Maritime Provinces, where it is exposed to a very salty atmosphere. The opinion of the meeting was that if it is deposited properly it should stand up for an average time.

Meeting was adjourned until September 23, 1929.

H. Wm. Graham, Secretary-Treasurer.

A. E. S. PAGE

Assembled Expert Scraps With and Without Significance

Rudy and Tom still play baseball, but it is getting harder to do it each year.

Why does H. Flannagan wear knickers to play bridge and other card games? Is he afraid boys will think he gets those winning aces from legs of his trousers?

Did you notice our Secretary-Treasurer George Gehling and Phil Uhl at the banquet when those dancers showed up?

Say, members, did it ever occur to you that your wife's intuition gag was lucky guess inspired by your guilty looking face?

John Wesley's Rule

Do all the good you can,
By all the means you can,
In all the ways you can,
In all the places you can.
At all the times you can,
To all the people you can.

For Men Only

Did you hear the story about the traveling man's bed—it's the bunk.

—H. G. P.

Self-Inquiry

"Let no soft slumber close
mine eyes
Ere I have recollected thrice
The train of actions through
each day;
Where have my feet worked
out their way?
What have I learned where'er
I've been,
From all I've heard, from all
I've seen?
What know I more that's
worth the knowing?
What have I done that's
worth the doing?
What have I sought that I
should shun?
What duties have I left undone?
These self-inquiries are the
road
That leads to Virtue and to
God."

—Pythagoras.

LOS ANGELES BRANCH (Temporary)

The June meeting of Los Angeles Branch was held Wednesday, June 12th at the Central Y. M. C. A. Twenty-five sat down to dinner after which temporary President Clarence Thornton called the meeting to order, business being disposed of the meeting was turned over to Chas. Russell, Librarian, for educational discussions.

A letter from Convention Committee was read asking branches for exhibits of work. Several members promised to have some work for the exhibit which will be a small one, as time is too short to get up real exhibit.

Question Box

Ques.: What can be done to offset too much arsenic in brass solution?

Ans.: Build up solution and plate Heck out of it, and arsenic will plate out.

Ques.: What is best anode to use in chromium solution?

Ans.: See Jacob Hay paper in the May issue.

Ques.: What is good for cynide sores?

Ans.: Make salve composed of 4 oz. Balm of Gilead, 1 lb. mutton tallow, use enough beeswax or rosin to harden salve. Mr. Jacques of Edison plant contributed above, and should be good for chromium sores and nickel itch.

Ques.: Gold plating and upkeep of solution.

Ans.: For ordinary yellow gold make up rich solution and work until it goes off color, reclaim and make up a new one.

Ques.: How can a statuary bronze finish be done direct on brass, without copper plating?

Ans.: Too long to repeat here, if interested write secretary.

Ques.: Can anyone give formula for Verde Green?

Ans.: Several formulas were suggested, if interested write secretary.

Meeting adjourned at 10:30, at the next meeting Mr. B. Foss will tell us how to copper plate aluminum direct without first nickel plating.

M. D. Rynkofs, Secy.

LOS ANGELES BRANCH (Temporary)

The regular monthly meeting of the above branch was held July 10, 1929, at the Central Y. M. C. A., Clarence E. Thornton presiding.

Twenty-seven sat down to dinner, after which the regular meeting was disposed of.

Officers for the fiscal years were nominated.

The meeting was then turned over to Chas. Russell, librarian, for educational discussion.

Question box contained the following:

Ques.: What is the best thing to counteract too much sulphuric acid in a chromium solution?

Ans.: Barium carbonate or add more chromic acid.

Ques.: How can copper bus bar be drilled easily?

Ans.: Use turpentine.

Ques.: What causes copper and brass to turn milky if left in the electric cleaner without current?

Ans.: Probably contamination from aluminum or zinc. Dip in strong muriatic acid.

The Los Angeles Branch meets every second Wednesday of each month at 6:30 p. m. at the Y. M. C. A.

M. D. Rynkofs, Temporary Secretary.

NEW YORK BRANCH

The regular meeting of the New York Branch, A. E. S., was held in the World Building, Park Row, New York City, on June 14, 1929.

The following officers were installed into office by Past President Thomas Haddow: President, Fred Haushalter; vice-president, Ralph Liguori; secretary and treasurer, John Sterling; recording secretary, Chas. Haushalter; librarian, Henry Levine; sergeant-at-arms, Ben Nadel; assistant sergeant-at-arms, Elias Schorr; trustees, A. Havens, J. Rolff and F. MacStocker.

Delegates to the Detroit convention are Frank MacStocker, Fred Haushalter and John Sterling.

Chas. Haushalter, Recording Secretary.

DETROIT BRANCH

Detroit Branch held its regular meeting June 7 at the Hotel Statler, President E. V. Allen presiding. The election and installation of new officers took place. The following are the officers for the coming year:

President—B. F. Lewis, 10398 American Ave.

Vice-President—J. Hay, 3909 Helen Ave.

Secretary and Treasurer—C. M. Phillips, 13421 Camden Ave.

Librarian—Geo. Keetzen.

Board of Managers—T. C. Eichstaedt, P. Stapleton, E. G. Lovering, Wm. McCord.

Delegates to Convention—Wm. McCord, chairman, E. V. Allen, T. C. Eichstaedt.

Alternates—Harry Webb, Arthur Sutcliffe, J. Hay.

Chas. M. Phillips, Secretary and Treasurer.

A. E. S. MEMBERS, SHOW TO YOUR EMPLOYER

Mr. George Gehling, Secretary-Treasurer,
American Electro-Platers' Society,
Philadelphia, Pa.

Dear Sir:

Although I am interested in plating only as one of the departments under my supervision, I had the pleasure of attending your Detroit Convention as a guest and hope to do so again.

I never appreciated before just what one of these annual meetings means. Here in one room were gathered several hundred men, all intensely interested in the plating art, ranging from highly specialized research workers down to the practical platers whose knowledge had been gained through hard experience. Just think of the opportunity,

with such a group, to get every possible angle on any phase of electroplating. And that is just what you did. Cadmium, chromium, brass, iron, and even non-metallic deposition; chemical and electrical control; analysis of solutions; wage incentives and material costs, were all discussed by men who knew thoroughly what they were talking about. And if any debatable statements were advanced, both sides of the question were completely covered.

Your society has a place in the industry that no other agency could fill. While a text book has a certain value, it usually represents the views of one man, and is some months or years behind the times. Your society represents the views and the experiences of hundreds of men who work at plating every day of their lives, and any statement or opinion advanced by it might be taken authoritatively as the state of the art **right up to the minute.**

Enclosed you will find check for a copy of the Proceedings of the Detroit Convention. I am very glad you had the foresight to preserve these discussions in a stenographic report. The book will be valuable, not only for the new ideas advanced in the papers, but also as a reference in meeting any problems that may arise in our plating department.

Very truly yours,
Harry Snyder.

Rossberg & Snyder Co., Philadelphia, Pa.

If the lady who has the chassis of my bird cage will send me her address I will send her the accessories to it. The bird cage was last seen adorning a lady's head while she was charming the audience with the song "The Bird in the Gilded Cage," and I will appreciate the return of the safety razor, as I valued it very much as a keepsake.

Sincerely your friend,
E. V. Allen.

1329 E. Vernor Highway, Detroit, Mich.
Phone Randolph 7484.

ROCHESTER BRANCH

I am sending you some news for the Review from Rochester Branch.

Rochester Branch held their July meeting on Sunday evening, July 20, at the Hotel Lafayette, Buffalo, N. Y. Rochester members and their friends from Buffalo and Niagara Falls enjoyed a chicken dinner at the hotel at 6:30 p. m., after which the meeting was called to order by President Reama, who told the visitors from Buffalo the benefits of being a member of the A. E. S. He then turned the meeting over to Mr. S. P. Gartland, who told what the boys in Rochester are doing and the wonderful co-operation there is among the platers of Rochester, and he then introduced Mr. Frank Kolb, chief chemist of the Bausch & Lomb Optical Co. of Rochester, N. Y., who invited the Buffalo men to get together and have a branch in their city, and he told them in a city as large as Buffalo all they needed was effort.

Mr. Gartland then introduced Mr. L. R. Eastman, chemist of Detroit, Mich., who gave a wonderfully interesting and very instructive talk on compositions.

Mr. Eastman's talk was very instructive to all and many platers know more about composition than they ever expected to know. Rochester Branch extended to Mr. Eastman a rising vote of thanks for his talk.

Chas. Griffin, Secy.

PITTSBURGH BRANCH NEWS

Program of the American Electrochemical Society, September 19, 20 and 21. Symoposium on Contributions of Electrochemistry to Aeronautics:

T. W. Bossert—"Use of Aluminum and Aluminum Alloys in Aircraft." (A general talk on the use of aluminum in aircraft showing characteristic sections, castings, etc.).

E. H. Dix, Jr.—"Alclad Aluminum Alloys for Aircraft." (A discussion of Aluminum Company of America's duplex alloys known as "Alclad"; these consist of a strong alloy core with a surface coating of high-purity, corrosion-resistant aluminum.)

J. D. Edwards and C. S. Taylor—"Electrolytic Potentials Between Aluminum and Its Alloys." (Some experimental and practical data on the solution potential relationships of aluminum and its alloys will be presented. These data are of particular interest in connection with the Alclad alloys, where the pure aluminum coating is electronegative to and protects the core from corrosion.)

W. G. Harvey—"The Use of Magnesium and Its Alloys in Aircraft Construction." (This is a general paper discussing the present and future possible uses of magnesium in aircraft, and is more or less a companion paper to that of Dr. Frary on aluminum.)

Discussion of above papers will be led by the following:

Mr. Edward P. Warner, editor of "Aviation."

Dr. George W. Lewis, director of Aeronautical research, National Advisory Committee for Aeronautics.

Mr. Starr Truscott, assistant to the director of research, National Advisory Committee for Aeronautics.

Miscellaneous Papers

1. Electrothermic Production of Gray Iron and of Malleable Iron, by Dr. G. L. Simpson of the Pittsburgh Electric Furnace Co.

2. Chromium Plating, by Dr. R. J. Piersol of the American Chromium Corporation, Wilkinsburg, Pa.

3. Potentials Against Corrosion Films, by Dr. Frank Speller, National Tube Company, Pittsburgh, Pa.

4. Recent Developments in Electric Melting, by Frank W. Brooke, The William Swindell Corporation, Aspinwall, Pa.

5. The Copper Oxide Rectifier, by Dr. L. O. Grondahl, Union Switch and Signal Company, Swissvale, Pa.

6. A New White Finish on Aluminum, and also, A New Explanation of Anodic Passivity in Sulphuric Acid, by Mr. Leon McCulloch, Westinghouse Research Laboratory, East Pittsburgh, Pa.

7. A Sixty Cycle Coreless Induction Furnace Installation, by Dr. Porter H. Brace, Westinghouse Research Laboratory, East Pittsburgh, Pa.

Kahlenberg & Krueger—Potentiometric Titration.

T. D. Yensen—Pure Iron.

Arthur S. King—Electric Vacuum Furnaces.

Smith & Breckenridge—Cathode Potentials of Copper.

McClure & Lowry—Preparation of Phenylhydrazine.

Willard & Schneidewind—Chromium Plating Baths.

Sherlock Swann—Caproic Acids.

Strock & Lukens—Tantalum Cathode.

N. A. Ziegler—Analysis of Carbon and Iron.

BRIDGEPORT BRANCH

The meeting opened with President Wagstaff presiding. The roll call of officers was read, three officers were absent. Communications were read. Bridgeport Public Library would like to have a copy of The Monthly Review. The members thought wisely if they communicate with Mr. Gehling. We had quite a few of our members at our last meeting. Since we have been holding our meetings in the Chamber of Commerce room our turn-out hasn't been up to standard. President Wagstaff has hopes that the old gang will turn out, as we may hold our meetings at the Hotel Stratfield. The application of Albert John Strauss was read and it was voted on that it take its usual course. Our old stand-by, John Oberender, gave quite an interesting talk of what they had and what they talked about at the convention. The Secretary was instructed to send for a copy of the minutes of the meeting (from the convention). The Treasurer's report was read and accepted. The meeting closed at 10 o'clock. After the meeting the main topic was Chromium Plating.

CHICAGO BRANCH

Regular monthly meeting of Chicago Branch held August 10, 1929, Atlantic Hotel.

The meeting was called to order with President S. J. Trapp presiding. Owing to the vacation season being still open, we found several of the regular chairs vacant.

President Trapp, after the regular routine of business, called upon Past President F. J. Hanlon, who read the Delegates' report on the Detroit Convention; report well received and a standing vote of thanks was given.

Mr. O. E. Servis, Librarian, then took charge of the Question Box for the evening.

Mr. Cyril Kocour gave us a demonstration with a Chloride Titration set for Nickel Solutions, also a demonstration on an analytical apparatus for Sulphate content of a chromium solution. Both these instruments were thoroughly explained and proved very interesting. Mr. Kocour has always been a worker to make progress for his fellow craftsmen.

QUESTION BOX—CHICAGO BRANCH

In a cyanide zinc solution, what causes dark rings to form on a circular object when using a reasonable current density? When a weaker current is used these streaks do not appear.

Consensus of opinion was that carbonates cause this trouble.

What is the best dip to use before nickel plating for chromium hydrofluoric acid or sulphuric acid to remove oxides?

Hydrofluoric acid 5% solution was suggested.

Which is preferable in a cleaning solution, high current density with low alkalinity or low current density with high alkalinity?

High alkalinity was thought to be the best for general cleaning. Consensus of opinion was it would be a case of cost of horsepower against chemicals.

What is a good brightener for brass solution, plating, die casting?

Arsenic was thought to be a very good brightener. Bisulphite of soda in lower density solution, Sal Ammoniac was also suggested.

Is a lead lined and glass lined steel tank used in any chromium installation? If so, how is the lead standing up?

Very good for lining, but care must be taken to prevent short circuits. Glass lining with lead was thought to be a good preventive against shorts.

What's better for polishing cold rolled steel and gray iron, natural emery or artificial abrasive?

Artificial emery was said to be very good in roughing operation. Turkish emery for finishing.

APPLICATIONS

	Branch
Alex Gromaeki, 777 76th Ave., West Allis, Wis.	Milwaukee
C. F. Conlin, 288 Center St., Sioux City, Ia.	Milwaukee

ELECTIONS

	Branch
N. F. Gerke, 298 Grove St., Milwaukee, Wis.	Milwaukee
M. W. Mrotek, 1108 S. 11th St., Manitowoc, Wis.	Milwaukee

ELECTED TO ACTIVE MEMBERSHIP

Frank H. Yarke, Box 11, Itasca, Ill.

Wm. F. Fox, 2304 S. Fifth St., Rockford, Ill..

RECEIVED APPLICATIONS

Walter P. Donnelly, 4742 School St., Chicago, Ill.

Raymond W. Conlin (Associate), care Allied Products Co., Chicago, Ill.

William Thompson (Active), 6335 Greenwood Ave., Chicago, Ill.

Carl W. Swift (Active), 133 S. Sunnyside, Brookfield, Ill.

RESIGNATIONS

	Branch
E. L. Oliver	Philadelphia
H. C. Maul	Philadelphia

SUSPENSIONS

	Branch		Branch
H. E. Armour	Milwaukee	F. E. Thompson	Milwaukee
F. S. Hall	Milwaukee	H. S. Wingart	Milwaukee
B. Nordblum	Milwaukee		

DEATHS

	Branch
F. Waldemeyer, Newport, Ky.	Cincinnati

LOS ANGELES BRANCH (Temporary)

The regular monthly meeting was held as usual the second Wednesday of the month at the Y. M. C. A., at 6:30 P. M. Thirty-three sat down to dinner.

The following were elected to office for the coming year: President, C. E. Thornton; Vice-Pres., D. M. Bedwell; Sec.-Treas., M. D. Rynkofs; Librarian, C. Russell; Assistant Librarian, J. Ellis; Sergeant-at-Arms, J. Jacques; Board of Managers, E. W. Francis, H. H. Dimmitt and F. C. Rushton.

We had four visitors Mr. Maurer, Chemical Engineer, Edison Appliance Co., Ontario, Calif.; Mr. R. Wild, Mr. R. J. Lockie and Mr. M. McBennett. The latter two made application for Membership.

Letters were read from E. W. Heil, whom we hope to have at our next meeting, and one from J. Caslis, Providence, R. I., on gold plating. A vote of thanks was ordered sent to Mr. Caslis for his interest in the baby branch.

Pitting of nickel deposits gold plating and chrome plating were discussed.

Meeting adjourned at 10:30.

M. D. RYNKOFS, Sec.-Treas.

Notice to Members

Washington, D. C., has been selected as the Convention city for 1930. The Baltimore-Washington Branch are the hosts, and as it is the Capital of the United States it holds much for the visitor in history and education. Prepare to come.

REPORT OF JUDICIARY COMMITTEE

Mr. F. J. Hanlon

Your Judiciary Committee met Tuesday, July 11, for the consideration of resolutions and amendments.

Mr. George Hogaboom, Chairman of the Past Presidents' Committee, who assisted the Secretary-Treasurer to recompile the Constitution and By-laws reported that while this work was in progress, many new thoughts had just come up, and his Committee were unable to present at this time augmented or finished set of laws or by-laws as requested, to meet the new conditions in this Society.

The Judiciary Committee recommended also that Delegate Past President Uhl present resolutions to the Society Thursday at the business session on the appointment of three members of the American Electro-Platers' Society to represent the English Society of Platers in the American Electro-Platers' Society to facilitate the exchange of ideas between both societies.

The Judiciary Committee then passed and approved that a vote of thanks be extended to the Research Committee and the Treasurer and the associates at the Bureau of Standards for their efforts in behalf of the American Electro-Platers' Society.

F. J. HANLON, Secretary,
Past Presidents' Committee.

A. E. S. Members

who are members of the American Electrochemical Society, are especially requested to remember the dates, September 19-21, inclusive, at Pittsburgh, Pa.

REPORT OF THE CONSTITUTION COMMITTEE

Mr. Geo. Hogaboom

This report was made to the Executive Committee so as to get their approval, and then it was reported also in the Past Presidents' or Judiciary Committee. The report is as follows:

Mr. President, the Committee which you appointed to reconstruct the Constitution of this Society wishes to submit the following report.

There is no record upon the minutes of the business meetings of the Supreme Society of any amendments that have been adopted. There have been several amendments adopted since the last revision of the constitution in 1922. Mr. George Gehling, our present efficient Secretary, has the minutes of the meetings he recorded in excellent shape.

A letter was sent to the Secretary of each Branch requesting information regarding the amendments offered. None had any record.

At the Toronto Convention, 1928, it was ordered that a word be substituted for "Supreme" in the constitution. The word "National" was suggested. Our Canadian Branches objected, and rightfully so. Several letters were sent out, and not one suggestion was received.

The Chairman of this Committee rewrote the constitution and a copy was sent to each Branch Society. Some objections offered caused further consideration of the Constitution as a whole, and this was done with a lawyer versed in constitutional law. It was found—

1st. That the Society is not incorporated. It should be. We are now an employer of labor, collect and distribute funds that have been obtained by public subscription. If the Society is sued every member is liable. If there is a misuse of funds, we have a poor standing in law.

If at present a Branch Society wishes to withdraw or cease to pay the per capita tax, we cannot prevent it. If the Society was incorporated, a Branch could not withdraw without a process in law.

2nd. We have two bodies in our Society—a Supreme Society and a collection of Branch Societies. Each have their own constitution and officers. If we incorporate which society will be

incorporated? We must reorganize so that there is one Society and one Constitution.

3rd. Our Constitutions contain both fundamental laws and by-laws. There should be a constitution and a separate set of By-laws.

RECOMMENDATIONS:

In view of the existing conditions, your Committee recommends:

1st. That the discussion of the rewritten Constitution and any amendments that may be offered be deferred.

2nd. That the President appoint a Committee of three which with the Executive Board have the power to engage the services of a lawyer to incorporate the Society and to reconstruct the Constitution to meet the requirements of corporate laws. No fundamental laws, however, can be changed.

3rd. That the Society be incorporated under the laws of the State of New York, which was the birthplace of the Society and which has an excellent corporate law.

4th. That the members of this committee be members of near branches, so that the President can take an active part in the work to be done.

5th. That the present committee be discharged.

Respectfully submitted,
WALTER FRAINE
HERBERT WILLIAMS
GEORGE B. HOGABOOM, Chairman.

REPORT OF THE AUDITING COMMITTEE

H. H. Williams

We have on this day audited the books of the Treasurer of our Research Fund and find same to be correct and kept in an able manner by Mr. P. Sievering.

We have also audited the books of our Secretary-Treasurer. These we find are correct and very efficiently kept. Much credit is due Mr. Gehling for his interest and enthusiasm in his work in this office.

The figures in both audits have been submitted in reports of these officers.

Respectfully submitted,
H. H. WILLIAMS
N. E. ZADOWSKI
F. C. MESLE

Now, as I said in the report, the figures have already been submitted. I personally do not see the use of submitting them. However, if you wish, Mr. Chairman, it can be done.

SECRETARY GEHLING: All the Delegates have read the figures, and there hasn't been a figure changed.

CHAIRMAN SMITH: I don't think it is necessary.

Delegates, you have heard the report of your Auditing Committee. What is your pleasure?

MR. STERLING: I move it be accepted as read, and the Committee discharged with thanks.

(Seconded and carried.)

CHAIRMAN SMITH: We will next hear the report of the Resolutions Committee.

REPORT OF RESOLUTIONS COMMITTEE

Walter Fraine

The Resolutions Committee met on Wednesday morning and sent letters or telegrams to one of the members, Mr. Lopez, who is away West on account of sickness, and another to our old friend, Richard Slider, one of the first Presidents of the organization, who is in a nursing home in New Jersey. We had a reply from Mr. Lopez which the Secretary read to you this morning, and possibly we will hear from Mr. Slider during the course of the Convention. Another of our past Presidents was unable to attend the Convention this year on account of the death of his son, Mr. Sylvester Gartland. A telegram of condolence was sent to him, so that he would know we were remembering him in his time of sorrow. That covers them all.

DAN WITTIG
WALTER S. BARROWS
WALTER FRAINE

CHAIRMAN SMITH: You have heard the report of your Resolutions Committee. What is your pleasure?

MR. JOHN H. FEELEY: I move it be accepted and the Committee discharged with the thanks of the Convention.

BALTIMORE-WASHINGTON

Meets in Enoch Pratt Library, Calhoun and Hollins Sts. Geo. F. Turner, Secretary, Baltimore, Md.

BOSTON

Platers' Supply Co., 202 Friend St., Boston. Secretary, A. W. Garrett, 45 King St., Dorchester, Mass.

BRIDGEPORT

Meets first and third Friday of each month at 62 Cannon St., Room 17, Bridgeport, Conn. Secretary, Wm. Ehrencrona, Box 301, R. F. D. No. 1. Bridgeport, Conn.

CHICAGO

Meets second Saturday of each month, at 8 p. m., Atlantic Hotel, 316 S. Clark St. Secretary, J. C. Kretschmer, 1914 Warner Ave.

CINCINNATI

Meets every Thursday, 7:30 p. m., at Vocational Training School, Spring and Liberty St. Secretary, Al. Yeager, 2021 Sherman Ave., Norwood, Ohio.

CLEVELAND

Meets first Saturday of each month at Hotel Winton. H. Terdoest, 380 Pioneer Ave., Akron, Ohio.

HARTFORD-CONN. VALLEY

Meets fourth Monday in each month alternately at 266 Pearl St., Hartford, Conn., and corner Broadway and Worthington St., Springfield. Secretary, Vernon Grant, 43 Putnam St., Bristol, Conn.

DAYTON

Meets first Saturday of each month at the Y. M. C. A., Dayton, Ohio. Secretary, Robert G. Suman, 2734 Ridge Road, Dayton, Ohio.

DETROIT

Meets the first Friday of each month at the Hotel Statler, Louis II Room, Detroit. Secretary, Chas. Phillips, 13421 Camden Ave., Detroit, Mich.

GRAND RAPIDS

Meets on the second Friday of each month at the Rowe Hotel, Monroe and Michigan Sts. Secretary, Jacob Van Dyke, 1361 Union Ave., N. E., Grand Rapids, Mich.

INDIANAPOLIS

Meets the second Saturday of each month at Hotel Denison. Secretary, Louis Mertz, 1725 Union St., Indianapolis, Ind.

LOS ANGELES

Secretary, M. D. Rynkofs, 1354 W. 25th St., Los Angeles, Calif.

MILWAUKEE

Meets second and fourth Thursdays of each month at Cor. 3rd St. and Highland Ave. J. N. Hock, 1229 W. 24th St., Milwaukee, Wis.

MONTREAL

Meets last Friday of month at Office of Secretary, John H. Feelay, 411 Aylmer St., Montreal, Quebec, Canada.

NEWARK

Meets first and third Fridays of each month at Franklin Hall, 41 Franklin St., Newark, N. J., at 8 p. m. Secretary-Treasurer, Geo. Rueter, P. O. Box 201, Newark, N. J.

NEW YORK

Meets every second and fourth Fridays of each month in the World Building, Park Row, New York City, N. Y. Secretary-Treasurer, J. E. Sterling, 2581 46th St., Astoria, L. I.

PHILADELPHIA

Meets first Friday of each month in the Harrison Laboratory Building, University of Pennsylvania, 34th and Spruce Sts. Secretary, P. Uhl, 2432 North 29th St., Philadelphia, Pa.

PITTSBURGH

Meets first Friday of each month at 8 p. m., at downtown branch, Y. M. C. A. Secretary, S. E. Hedden, 227 Fifth St., Aspinwall, Pa.

PROVIDENCE-ATTLEBORO

Meets first and third Thursday of each month at 44 Washington St., Prov. Engineers Rooms, Providence, R. I. Secretary, J. H. Andrews, 19 Rosedale St., Providence, R. I.

ROCHESTER

Meets every third Friday of each month at the Powers Hotel. Secretary, Chas. Griffin, 24 Garson Ave., Rochester, N. Y.

ST. LOUIS

Meets second Friday of each month at Central Y. M. C. A., 16th and Locust St. Secretary, C. T. McGinley, 8214 Fairham Ave., University City, Mo.

TOLEDO

Meets first Thursday of each month at Toledo Secor Hotel, corner Cherry and Page Sts. Secretary, W. W. Welker, 2228 Middlesex Rd., Route 2, Box 635, Toledo, Ohio.

TORONTO

Meets fourth Monday of each month at Canadian Foresters' Hall, 22 College St., Room No. 2. Secretary, H. W. Graham, 26 Beatrice St., Toronto, Canada.

WATERBURY

Meets every second and fourth Thursday of each month. Secretary, Wm. F. Guilfoile, Garden Theatre Bldg., East Main St., Waterbury, Conn.

WORCESTER

Meets Directors' Room, Chamber of Commerce, Worcester, Mass.

1928-1929

Roger H. Bryant, Secretary, 94 Grove St., Worcester, Mass.